

Marketing Minnesota's Energy Code to Consumers

We just don't build like we used to!

Phil Smith

Minnesota Department of Commerce

State Energy Office

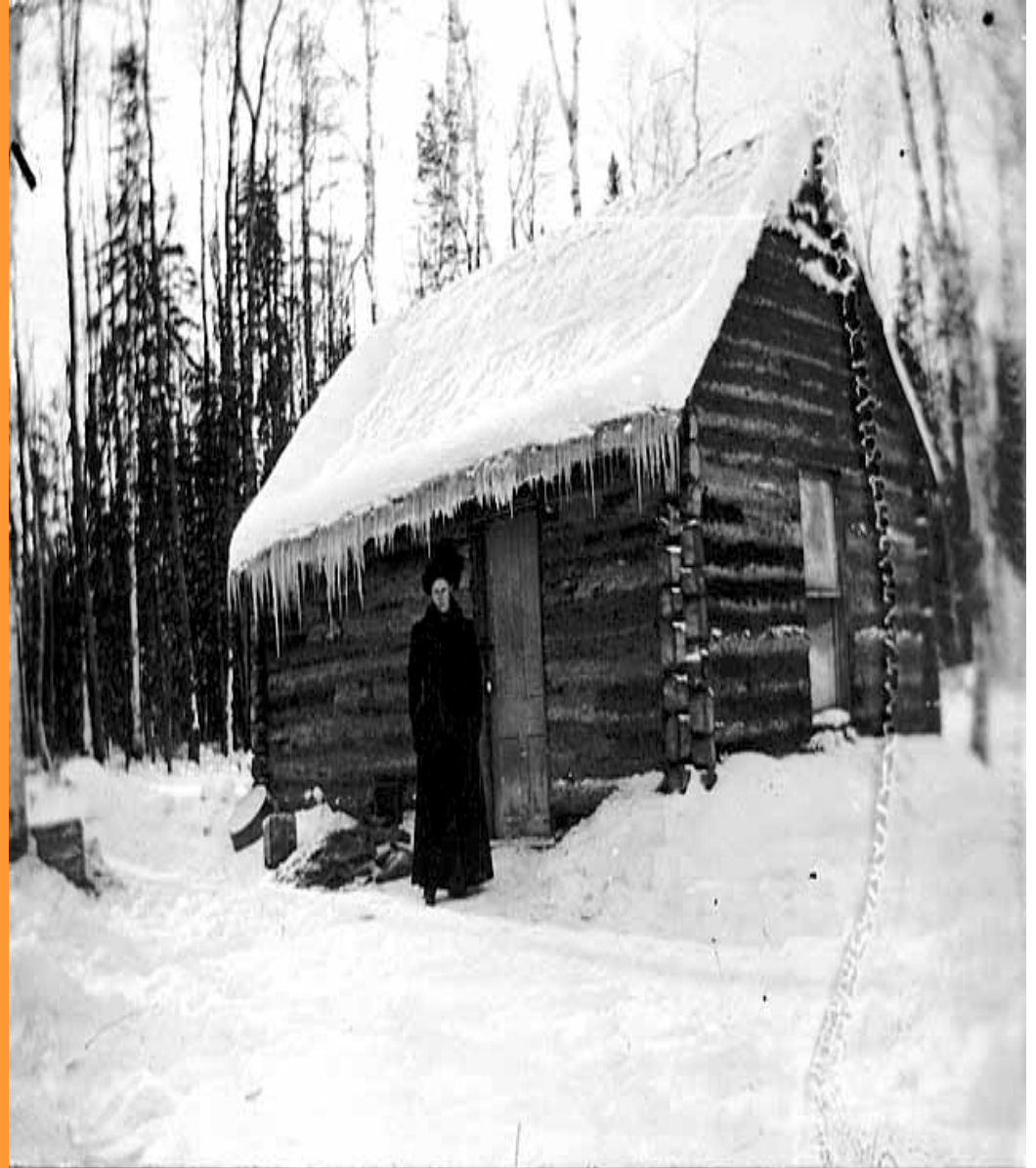
Greetings From Minnesota



- Land of 10,000 lakes
- Tower, MN hit -60 F February 2, 1996.

Energy Code History

- *First implemented in '76*
- Code covers 20% land area 80% population
- MN Population split between TC Metro and rest of State
- Contractor Licenses oblige Code compliance
- *34°F This July in Baudette*



Energy Code History

- *1991 mandate to adopt energy code rules that **"...equal or exceed the most energy-conserving codes adopted by any other state."***
- *Adoption of rules in stages - 1993 and 1998*
- *In 2000 Legislative action amended rules, giving residential builders two options for meeting the requirements of the energy code. Category 1 and Chapter 7672*

Communicating the Paths to Compliance

BUILDER'S UPDATE

SPRING 2000

News & Information from the Minnesota Department of Commerce on Energy Conservation and Licensing

SUMMARY OF REQUIREMENTS OF THE NEW 2000 RESIDENTIAL ENERGY CODE

New energy code rules are in effect for residential building permits beginning April 15, 2000. They apply to detached single-family and two-family dwellings (classified as Group R, Division 3 Occupancies). The new rules (Chapter 7672) were adopted in 1998 following five days of public hearings in which more than 75 experts and interested parties testified. The rules are based on the latest information on cold climate housing and were drawn up in extensive consultation with

heating and exhaust systems. (See sidebar on page 9) This option, termed option (a), provides fewer alternative methods for achieving compliance and is less prescriptive than 7672, relying more on individual interpretations and judgments. It gives the builder greater responsibility for ensuring the quality of the finished product.

For remodeling and multi-family homes, the builder must comply with either Chapter 7672 or 7670. (If 7670 rules are followed, the additional ventilation and other mechanical requirements do not apply.)

For three or more attached dwelling units, three stories and less in height, builders must comply with Minnesota Rules Chapter 7670 or with Minnesota Rules Chapter 7674. (Again, the additional requirements for Chapter 7670 do not apply.)

This edition of the Update summarizes the major changes in the new rules 7672 (termed option (b) in the legislation), and includes a table enumerating requirements for both option (a) and option (b) (see insert). Future issues of the Update will focus on details of specific new requirements and effective ways to go beyond code requirements.

builders, building scientists, and others in the building industry. Responding to the request of many builders, the rules contain fairly detailed prescriptions; at the same time they often provide alternative methods for achieving code compliance.

The 2000 legislature also gave builders an alternative to the new rules instead of following Chapter 7672; they can meet the provisions of Minnesota Rules 7670 (the energy code adopted in 1994) that apply to Category 1 buildings, plus some additional requirements regarding ventilation and

**Effective April 15, 2000:
New energy code rules are in effect for
building permits beginning April 15, 2000.**

Summary of April 15, 2000 Energy Code Requirements for Detached 1&2 Family Residential Buildings

Code requirement	Option A - Chapter 7670 Category 1 as amended by Laws of MN 2000, Ch. 487	Option B - Minnesota Rules Chapter 7672
6. Vapor retarder		
General	Vapor retarder must be installed on the warm side of all walls and ceilings. Required for rim joints susceptible to condensation from moisture diffusion.	Added requirements for vapor retarder on all rim joints and earth floors of unheated crawl spaces.
7. EXTERIOR AIR BARRIER		
General	Exterior air barrier must be installed on exterior walls and ceilings, including rim joints, electrical boxes, & fan housings.	Continuous exterior air barrier required. Exterior air barrier must be specifically identified. Definition of "seal" added.
Fire blocks	Required to be air sealed.	Specific fire block locations are listed, such as where interior heating ducts or insulated ceiling or exterior wall. Sealing required.
At electrical & telecommunications penetrations	All penetrations required to be sealed to prevent air leakage.	Same.
Flashing & heating penetrations	Required to be sealed to prevent air leakage.	Same.
Air barriers behind tubs & showers	Air barrier required for exterior walls.	Same, plus it must be covered to protect against physical abuse.
8. Wind wash barrier		
Wind wash barrier materials	Not addressed. HOUSE WRAP IS NOT REQUIRED.	Rigid or flexible materials permitted. Flexible wind wash barrier must meet ASTM E1487. HOUSE WRAP IS NOT REQUIRED.
At edge	Required and must be of rigid material.	A rigid wind wash barrier is required to the bottom of the top track chord.
Overhangs	A wind wash barrier must be installed at cantilevered floors and bay windows.	Same, with added requirement that the wind wash barrier be sealed.
Rim joint	Not addressed.	Sealed wind wash barrier required.
Sealing joints & penetrations	Joints not over solid blocking must be sealed.	Joints not over solid blocking & penetrations must be sealed.
Garage wall	Not addressed.	Sealed wind wash barrier required. Firewall sealed at edges, joints & penetrations.
9. Thermal insulation placement, support and identification		
General	Not addressed.	Insulation must be in substantial contact with interior surface.
Support on unconditioned side	Not addressed.	Insulation in floors and walls must be supported by blocking or other material on the unconditioned side to resist movement & wind wash.
Site inspection	Site card required. Requirement for either site inspection by owner or tag/burn tags installed to verify insulation quantity.	Same, plus notification posted near the building inspection card indicating the installed site R-value and date of installation. Barrier required to prevent loose fill from entering cavity.

Page 2 of 4

4/98

Protection Against Excessive Depressurization

- **Backdrafting**

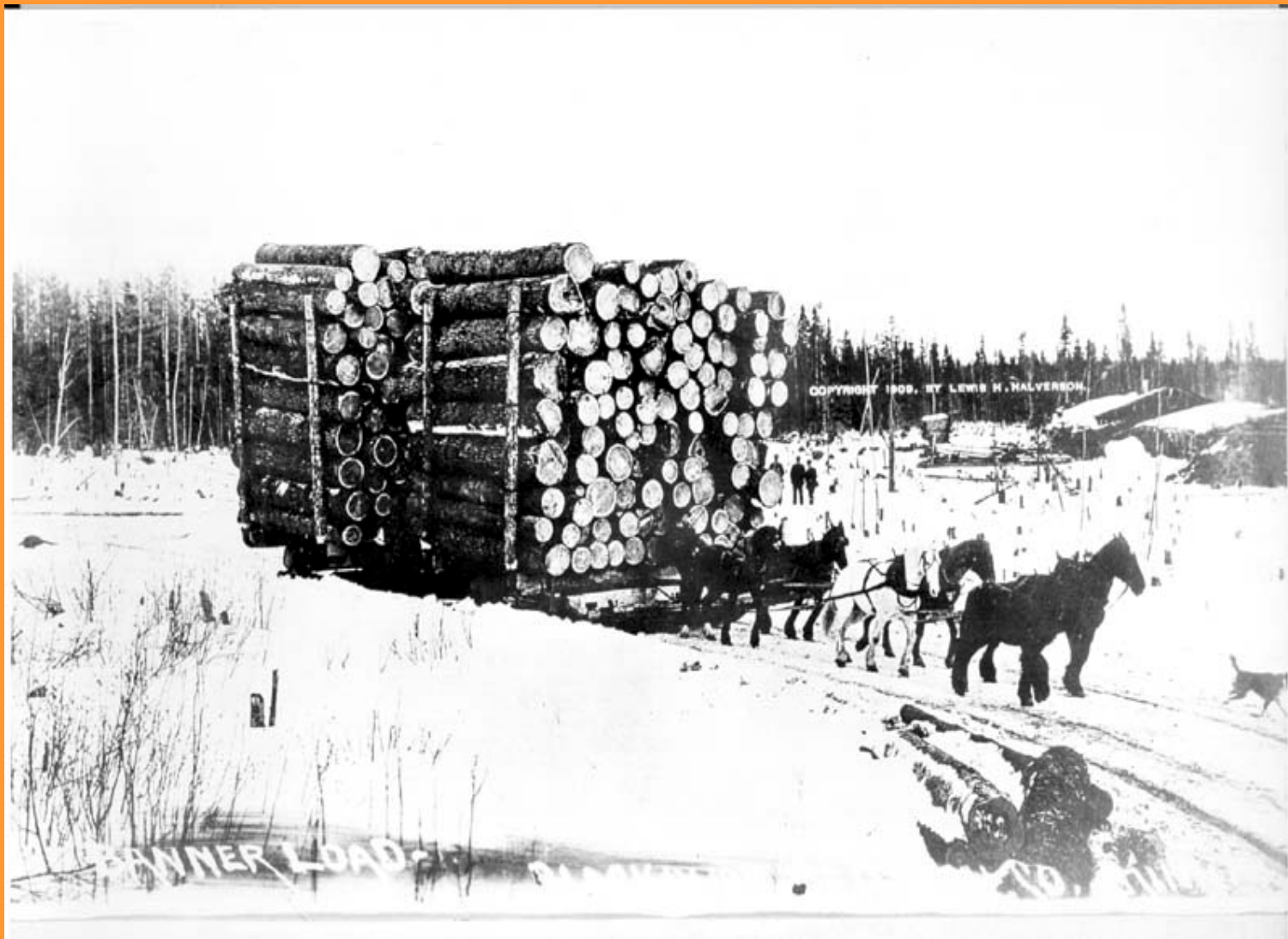
Partnerships



We Just Don't Build Like We
Used too!



Materials Have Changed



House as a System

- Hammer Home the message that Materials and Methods have changed



Partnerships





behind Neagle;
Cleveland tops
Orioles in 12

puts his life
into words

constellation of
new female stars

F1



BS
Singer's 1994
1994 Aug. 10/11/94

nday

(JULY 12, 1997)

13.75

Star Tribune

NEWSPAPER OF THE TWIN CITIES

www.startribune.com

St. Paul
Edition

of tapes: ow-motion of errors

vide later stumbled upon the series of mistakes — and a publisher — began to unfold.

But here, looking before the book is even out of print, a reader of a recent issue of *Star Tribune* who had been in the office of the publisher, had stumbled upon the series of mistakes — and a publisher — began to unfold.

A Star Tribune Special Report

Many new houses are deteriorating, and indoor air is contaminated. While the building industry and state officials try to reach agreement on more stringent standards, thousands of defective houses are being built in Minnesota, and homeowners face large repair bills.

Home health
The author
has been
a victim of
lead paint
problems.
She is shown
with a child
after prob-
lems. She said
the lead was
found in the
walls of the
house. The
walls in the
house were
saturated, and
the child was
suffering from
lead poisoning.
The child was
also found to
have lead in
his blood.

As Target hits the East Coast, the department-store chain is hoping to hit the mid-eyes with deals that draw on its Minnesota roots.

Minnesota Nice ct New Yorkers get stores?

Target's plan to open a new store in the Twin Cities is a sign of the company's growing presence in the Midwest. The company is looking to expand its footprint in the region, and the new store is expected to be a success.

New houses in Minnesota at risk for moisture and rot

Problems have been known for 10 years; houses built in past 15 years most affected

The trouble with houses

Find a Minnesota owner

Getting up

Planning

Planned houses can be improved and prevented from becoming a disaster.

Funding

Owners of aging new houses face a little help. Also, a house

Some new houses in Minnesota are built with a serious flaw: they are not built to last. The problem is not the quality of the materials, but the way the houses are built. The houses are built with a design that is not meant to last. The houses are built with a design that is not meant to last. The houses are built with a design that is not meant to last.

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House as a System

- Understand the driving forces
- understand the materials
- understand the relationships



New Materials



What we had to sell

- New Energy Code Reduces problems
 - Reduced moisture problems
 - Reduced air quality problems
- Increased combustion equipment safety
- reduced call backs and a better bottom line

House as a System is the Key Message

- Made up of
 - Structure
 - Mechanical Systems
 - Residents
 - All are dynamic and all interact
 - Every Action has an Equal and Opposite Reaction

House As a System

- Full Coverage - Optimum Thermal Insulation
 - Air barrier to permit insulation to perform as designed
 - gaps in sheathing and wind wash over top plates reduce insulation performance causing call back\$



House as a System

- Today we can test and demonstrate proving assumptions



House as a System



House as a System

- Rim Details

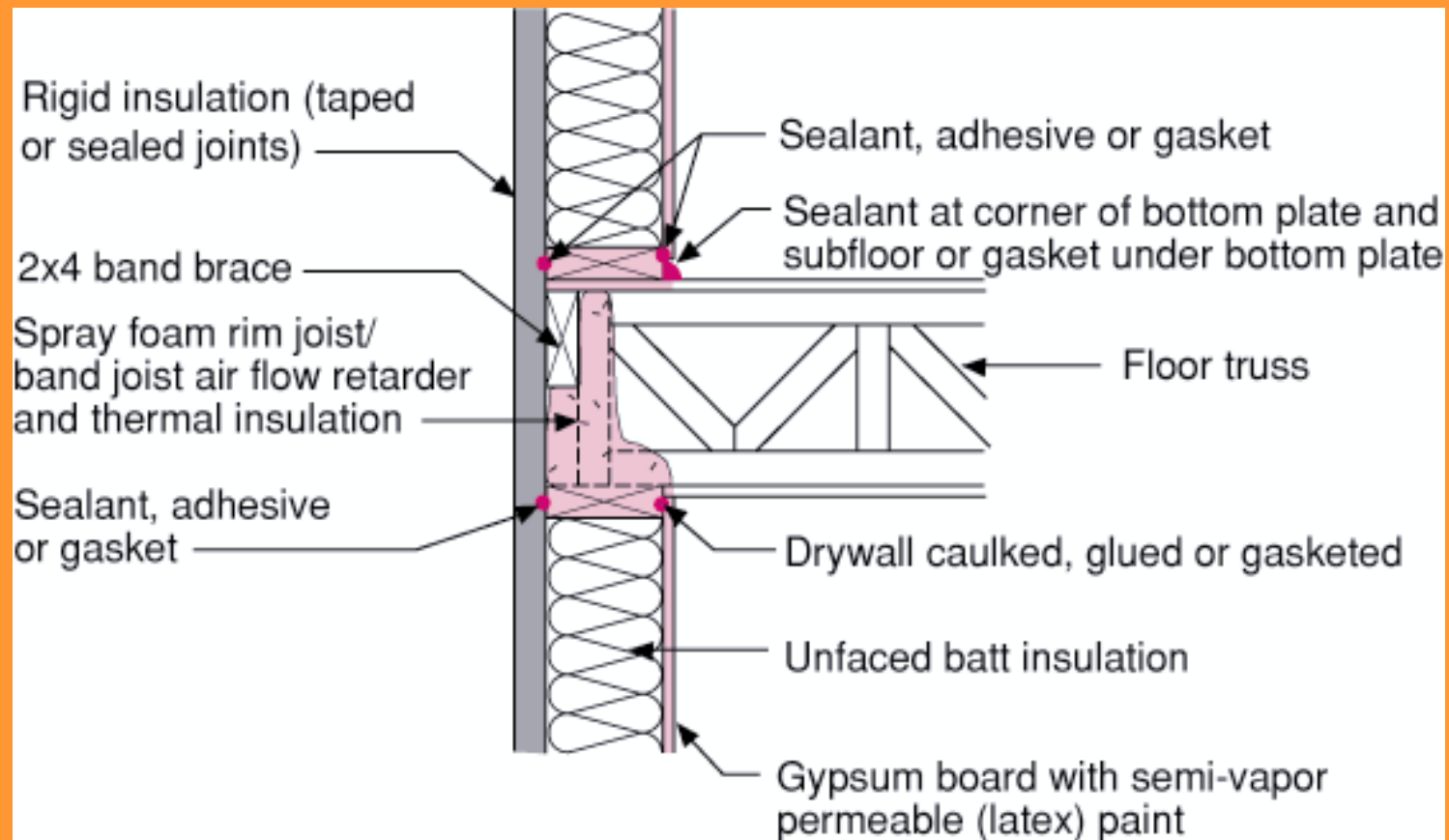


House as a System

- Rim Details

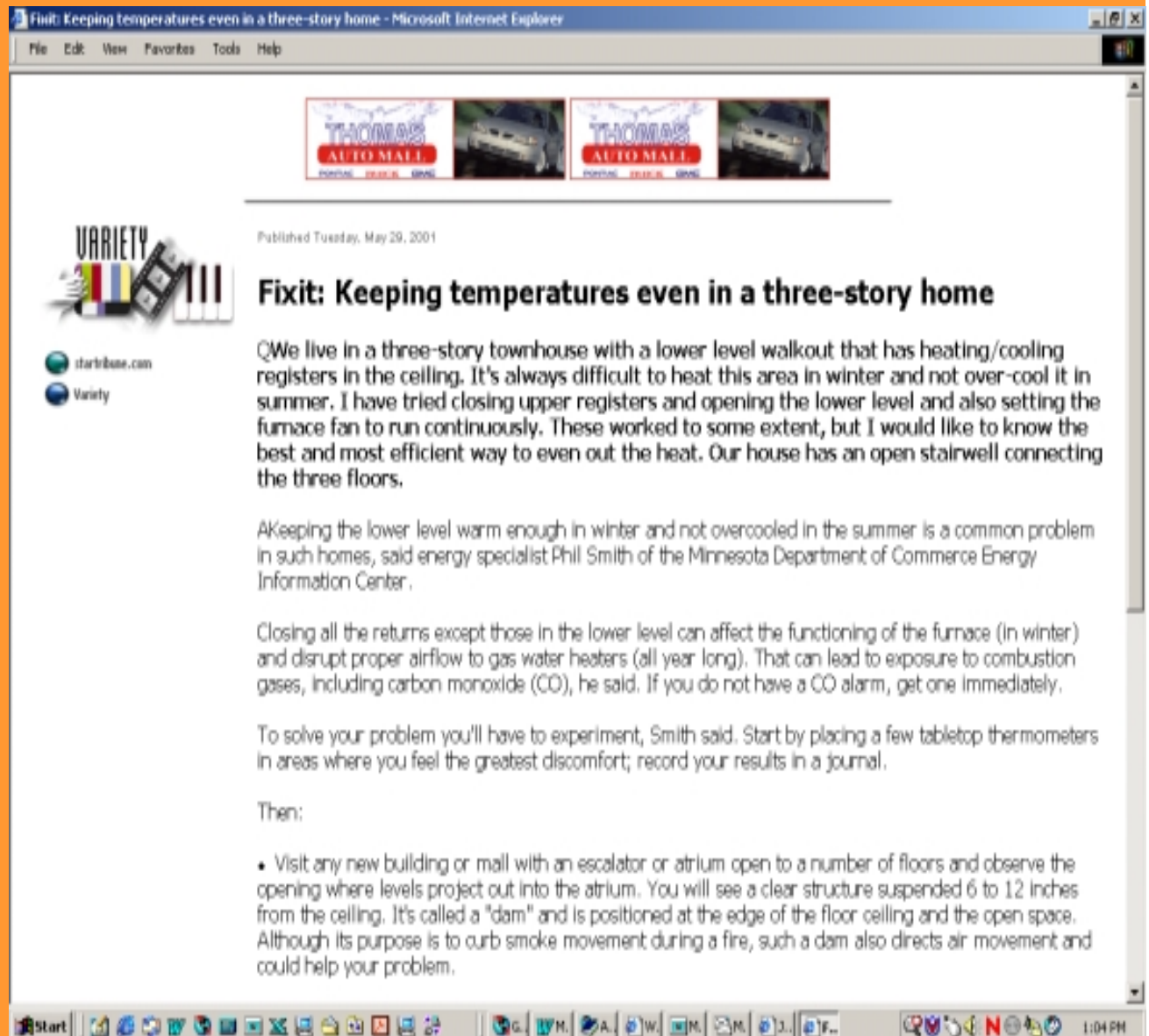


House as a System



Communication Strategies

- Author Columns in press



Develop Media Partnerships

LOG LAIRS
The Log Home Living & Timber Frame Show runs through Sunday at the Minneapolis Convention Center. **Turn to H8**

Homes
www.startribune.com/homezone
StarTribune

INDEX
Real estate transactions
Kenneth Harney **H8** **HO**
Calendar **H12** **Re**
Help lines **H17** **Mc**

(3/4/7) Saturday, April 7, 2001

The Millionaire Star house built by Minnesota Power in Duluth has no residents, but plenty of guests — more than 10,000 people have visited the energy-efficient demonstration house since it was built. The house costs less than \$300 a year to heat and cool. It also incorporates many recycled or recyclable products, including steel siding and decking material made from a plastic and wood composite.
Star Tribune photo by Quane Bailey



A house full of ENERGY
A Duluth utility built a home that showcases energy-efficient features. **Page H4**

TAX T
Beware of taking for 'special tax a
Taxes you pay on property generally are deductible, but be aware that "special tax assessments" don't always qualify as a deductible real estate tax. Whether a special assessment can be written off depends on what the proceeds of the levy are used for.
If the money is used for maintenance or repairs, such as fixing potholes in the street, the assessment is considered a deductible real estate tax.
But if the proceeds are for improvements that increase the value of homes that the assessment is levied on, the tax is not deductible. For example, if the local government levies a special assessment to add sidewalks and streetlights, the tax wouldn't be deductible.
— Gary Klatt, National Newspaper

EYE ON THE N
Mortgage rates
Average interest rate offered by area lenders for the past 30 days.
30-year fixed
1-year ARM
Source: NBER



Renters' report
Average rent for the Twin Cities
Source: Spectrum



House as a System is the Key Message

- Made up of
 - Structure
 - Mechanical Systems
 - Residents
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 - Every Action has an Equal and Opposite Reaction

Communication Strategies

- Establish a knowledgebase among Consumers & Builders
- Home Energy Guides

Building Science Primer

Patrick Huelman
University of Minnesota



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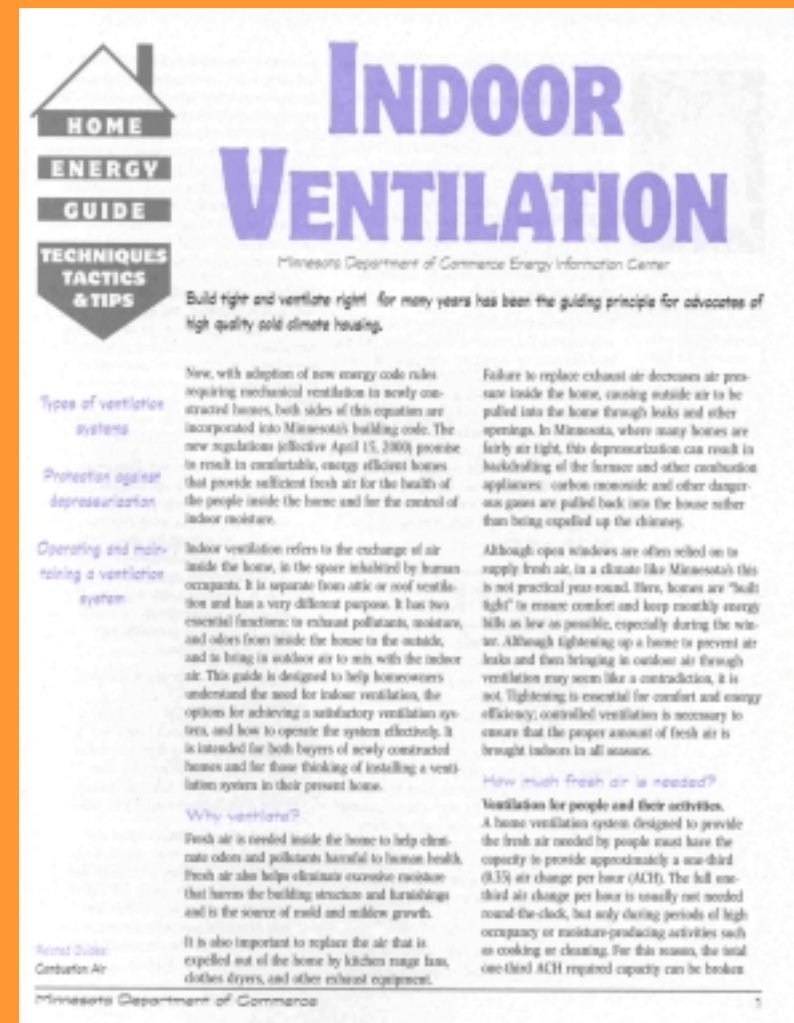
Communication Strategies

- Establish a knowledgebase among Consumers & Builders
- Home Energy Guides



Communication Strategies

- Establish a knowledgebase among Consumers & Builders
- Home Energy Guides



Communication Strategies

– ***Energy Information Center***

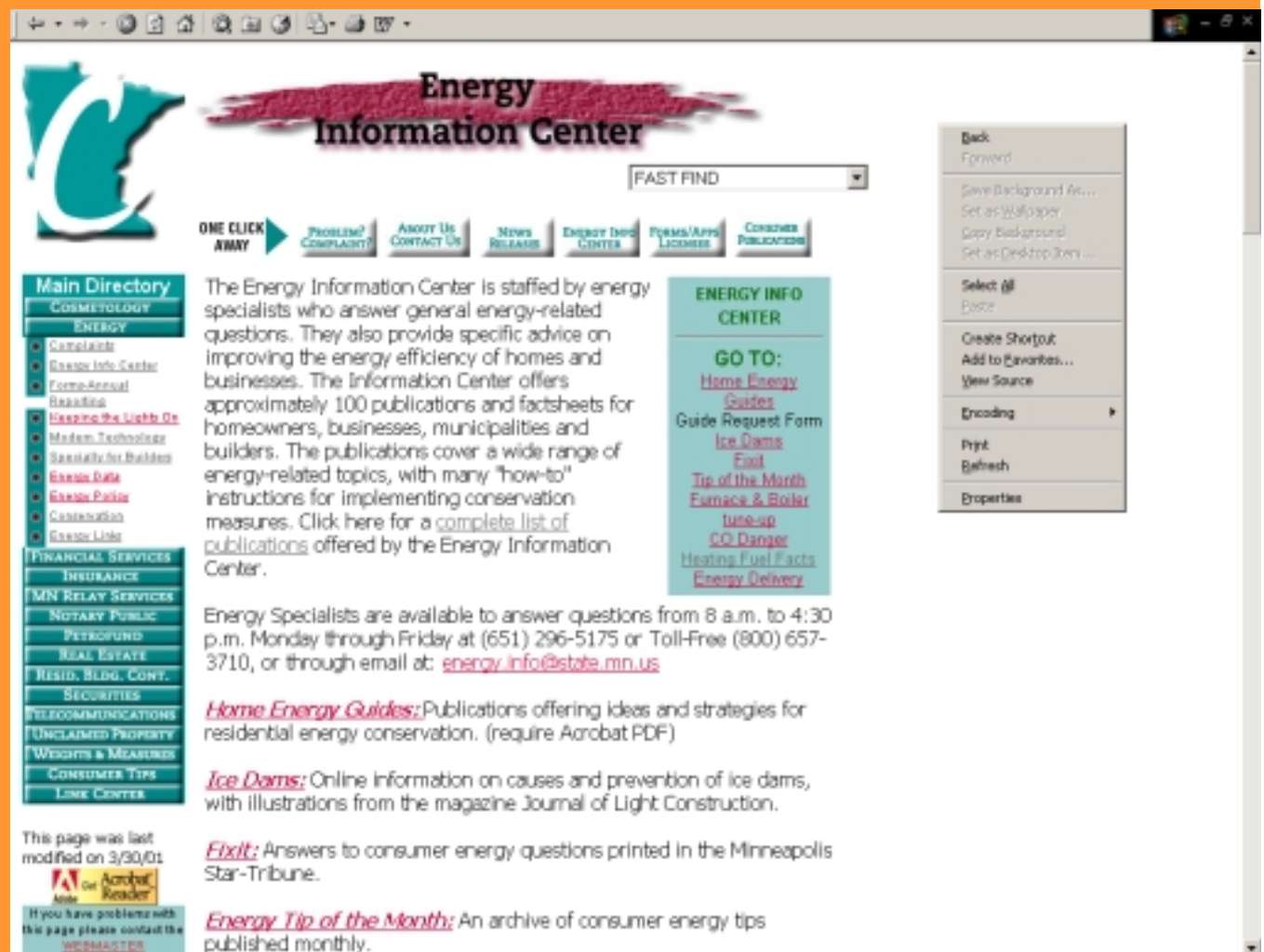
- ***Energy Specialists are available to answer questions from 8 a.m. to 4 p.m. Monday through Friday at (651) 296-5175 or Toll-Free (800) 657-3710, or through email at:***
- ***energy.info@state.mn.us***

Communication Strategies

- Energy Information Center activities yield
 - Distribution of 230,000 publications in hard and electronic format
 - 10,000 to 15,000 direct contacts
 - additional 30,000 to 35,000 indirect contacts

Communication Strategies

- Web resource



The screenshot shows the Energy Information Center website. The header features a logo with a stylized 'E' and the text 'Energy Information Center'. Below the header is a 'FAST FIND' search bar and a row of buttons: 'ONE CLICK AWAY', 'PROBLEM? COMPLAINT?', 'ABOUT US', 'CONTACT US', 'NEWS RELEASES', 'ENERGY INFO CENTER', 'FORMS/APPS', 'LICENSES', and 'CONSUMER PUBLICATIONS'. The main content area is divided into three columns. The left column contains a 'Main Directory' with links to 'COMMETOLOGY', 'ENERGY', 'FINANCIAL SERVICES', 'INSURANCE', 'MN RELAY SERVICES', 'NOTARY PUBLIC', 'PETROFUND', 'REAL ESTATE', 'RESID. BLDG. CONY.', 'SECURITIES', 'TELECOMMUNICATIONS', 'UNCLAIMED PROPERTY', 'WOODS & MEASURES', 'CONSUMER TIPS', and 'LINK CENTER'. The middle column contains a paragraph about the Energy Information Center, stating it is staffed by energy specialists who answer general energy-related questions and provide specific advice on improving energy efficiency. It also mentions that the center offers approximately 100 publications and factsheets for homeowners, businesses, municipalities and builders. The right column contains a 'GO TO:' section with links to 'Home Energy Guides', 'Guide Request Form', 'Ice Dams', 'Fast', 'Tip of the Month', 'Furnace & Boiler', 'tune-up', 'CO Danger', 'Heating Fuel Facts', and 'Energy Delivery'. At the bottom of the page, there is a footer with the text 'This page was last modified on 3/30/01' and a small logo for 'Acrobat Reader'.

Energy Information Center

FAST FIND

ONE CLICK AWAY

PROBLEM? COMPLAINT? ABOUT US CONTACT US NEWS RELEASES ENERGY INFO CENTER FORMS/APPS LICENSES CONSUMER PUBLICATIONS

Main Directory

- COMMETOLOGY
- ENERGY
 - Catalytic
 - Gasco Info Center
 - Form Annual
 - Readings
 - Keeping the Lights On
 - Modern Technology
 - Sanitary for Builders
 - Gasco Data
 - Gasco Price
 - Construction
 - Gasco Link
- FINANCIAL SERVICES
- INSURANCE
- MN RELAY SERVICES
- NOTARY PUBLIC
- PETROFUND
- REAL ESTATE
- RESID. BLDG. CONY.
- SECURITIES
- TELECOMMUNICATIONS
- UNCLAIMED PROPERTY
- WOODS & MEASURES
- CONSUMER TIPS
- LINK CENTER

The Energy Information Center is staffed by energy specialists who answer general energy-related questions. They also provide specific advice on improving the energy efficiency of homes and businesses. The Information Center offers approximately 100 publications and factsheets for homeowners, businesses, municipalities and builders. The publications cover a wide range of energy-related topics, with many "how-to" instructions for implementing conservation measures. Click here for a [complete list of publications](#) offered by the Energy Information Center.

ENERGY INFO CENTER

GO TO:

- [Home Energy Guides](#)
- [Guide Request Form](#)
- [Ice Dams](#)
- [Fast](#)
- [Tip of the Month](#)
- [Furnace & Boiler](#)
- [tune-up](#)
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- [Energy Delivery](#)

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Home Energy Guides: Publications offering ideas and strategies for residential energy conservation. (require Acrobat PDF)

Ice Dams: Online information on causes and prevention of ice dams, with illustrations from the magazine Journal of Light Construction.

Fixit: Answers to consumer energy questions printed in the Minneapolis Star-Tribune.

Energy Tip of the Month: An archive of consumer energy tips published monthly.

This page was last modified on 3/30/01

Acrobat Reader

If you have problems with this page please contact the WEBMASTER

Develop Media Partnerships

"We're using people's homes as laboratories. . . . We haven't got a clue whether [new building materials] will last 10 years, 15 years, 20 years."
— Alan Mooney, president, Criterium-Mooney Engineers, Portland, Maine



"I think our industry is on track with the automobile industry . . . the car you bought before the Japanese turned on the heat was not a very good car. Today, the cars in the U.S. compare very favorably. . . . I think the same process is going through the housing business."
— Hans Hages, building contractor, Friday

Key to the durability of a house is in the details, not the price

There is no simple formula for building a durable, healthy house, but it can be done. Sometimes it takes extra attention to the less-glamorous aspects of a new house, but it doesn't necessarily mean a lot of extra expense.

Rick Carter's goal was to build a house in Minneapolis that was affordable, durable and healthy, with good indoor air quality for his wife and two sons. As vice president of LJB Engineers and Architects, he was able to draw on his professional experience.

The Carters set a budget of \$150,000 or less for the house. To stay within it, they made choices about the size and features of the house. At 1,750 finished square feet, the house they built in 1996 is smaller than the average new home, has few amenities such as whirlpool bathtubs and marble counter tops and costs less. The two-car garage is detached, a rarity in new homes but a good way to make sure that carbon monoxide doesn't enter the home and poison occupants.

The upshot of excluding some amenities is a house that Rick

Carter believes will be durable and safe because it has whole-house mechanical ventilation, an air infiltration system, sealed-combustion appliances (including a gas fireplace), a central vacuum system, sealed ducts and foundation waterproofing. Few new homes have any of these features, which Carter estimated added about 2 to 3 percent to the home's cost.

The house was built to the specifications of the American Lung Association's Health House guidelines. The Health House program is a national consumer education project that focuses on improving indoor air quality in new homes. It promotes

building tight, well-ventilated homes that surpass the minimum requirements of most states' building codes, including Minnesota's. Carter hired a builder, Bill Small of Classic Structures Inc., and subcontractors whom he knew had the skills to build the house using techniques and materials that would prevent moisture and durability problems. Nearly a year after moving into the house, the Carters are

building tight, well-ventilated homes that surpass the minimum requirements of most states' building codes, including Minnesota's. Carter hired a builder, Bill Small of Classic Structures Inc., and subcontractors whom he knew had the skills to build the house using techniques and materials that would prevent moisture and durability problems. Nearly a year after moving into the house, the Carters are



When Rick Carter designed his house, he tried to improve air quality by limiting the sources of pollutants and providing adequate ventilation.

pleased. They've had fewer upper respiratory illnesses than they had in their former 10-year-old house, and the new house has been free of moisture problems.

The Carters don't plan to sell the house any time soon, but Rick Carter acknowledges it may be more difficult to sell the house because it doesn't have all the features buyers are attracted to in new houses. Carter says most homeowners don't pay attention to the long-term life of their house.

"People own houses a shorter time than they own cars," Carter said. "How do you get the world to be concerned about getting houses to last for 50 or 100 years when we only own them for seven?"

Sometimes simplicity is the key to avoiding problems. Theresa Moore and her son live in a new split-level house that stands behind two large pine trees on a narrow lot in north Minneapolis. Like the Carter house, her home has few amenities.

The simple, \$87,000 house was performance-tested by house

inspectors I've seen in new construction."

The 1,300-square-foot house was built by Kent Adolphson for the Greater Minneapolis Metropolitan Housing Corp., a non-profit housing developer. It performs well in part because it has been well-protected from moisture. It has gas-filled, double-paned casement windows and well-sealed, rigid heating and cooling ducts.

The basement stays dry because the house has a good water management system, including gutters, drainage away from the house and a well-insulated, poured concrete foundation. The only problem Klossner found was some evidence of mold growth on floor joists above a crawlspace with an unsealed vapor barrier.

The home's greatest asset is probably its simplicity. The house doesn't have recessed lights, a large whirlpool bathtub or other popular features that can cause excess moisture or allow moisture to enter into the

Some building materials less tolerant of moisture

When it comes to building durable, healthy houses, moisture is the enemy: it causes mold and rot, shortening the life of wood components and hurting indoor air quality. New-generation building materials may offer superior thermal, structural and aesthetic qualities, but they also tend to be less forgiving of exposure to moisture.

Most lumber now comes from young trees, which is about 25 percent weaker than old-growth lumber. Cycles of wetting and drying can cause twisting and warping of wall studs, causing nail pops and wall cracks.

As lumber supplies dwindle and costs increase, scientists have developed alternatives such as composite wood products, including fiberboard and particle board, some made from compressed and glued pieces of wood. These products are very absorptive and are more susceptible to degradation from moisture.

New products such as windows, doors and wood composites often are developed and tested in controlled factory conditions. At a building site, conditions may be radically different; for instance, wood products may

be exposed to rain and snow, which can weaken them.

Moisture and rot

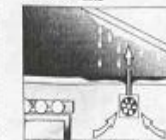
Many moisture problems can be traced to window condensation. Warm air moves toward cool areas, and warm air holds more water vapor than cold air. When warm indoor air meets a cold surface such as a window, moisture condenses on the glass. If the surface is really cold, the condensation will freeze. When the surface warms, water will run down the glass, wetting the wooden frame. After several wetting cycles, mold — and eventually rot — sets in.

Problems can be hidden. Warm, moist air can escape hazily through cracks, gaps and spaces inadvertently built into the house. But before the air gets all the way outdoors, it meets and unloads its moisture on cold surfaces in the walls and attics, causing mold and rot. In winter, warm air in the attic also causes snow on the roof to melt and refreeze, resulting in ice dams on the roof.

"Ice dams are not an act of God," said Minnesota building scientist Gary Nelson. "New houses that are built right shouldn't have ice dams."

Moisture problem areas

Exhaust fans



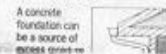
Wood components, including structural framework, roof decking and wall sheathing, can rot when moist air is vented into the attic or into the house instead of to the outside.

Doors and windows



Improperly installed and poorly constructed windows and doors allow moisture leaks that can cause rot in siding, walls and window trim.

Foundations



A concrete foundation can be a source of excess ground-moisture.

Attics



Theresa Moore, who had her house performance-tested by house

Communication Strategies

- Target consumer
Trade Shows - Home and Garden Shows
 - State wide events MN State Fair - 1.4 to 1.6 annual attendance
 - We will have 20,000 - 25,000 consumers stop at our booth over the course of the FAIR



Trade Show Display



Trade Show Display



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- ***CD great market response to electronic media***

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Develop Media Partnerships

- An energy-efficient house undergoes a blower door test to fulfill requirements for the Premier Home program. Some of the energy-efficient features in the utility area on the first floor include an air-to-air heat exchanger, left; the furnace, and in the distance, the water heater.



Develop Media Partnerships

4,400 Ft. Sq. for \$440 a year

- \$400 for heat, air conditioning and hot water for a year.

